COVID-19 vaccines: Get the facts

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Looking to get the facts about COVID-19 vaccines? Here's what you need to know about the different vaccines and the benefits of getting vaccinated.

By Mayo Clinic Staff

As the coronavirus disease 2019 (COVID-19) continues to cause illness, you might have questions about COVID-19 vaccines. Find out about the different types of COVID-19 vaccines, how they work, the possible side effects, and the benefits for you and your family.

COVID-19 vaccine benefits

What are the benefits of getting a COVID-19 vaccine?

Staying up to date with a COVID-19 vaccine can:

- Help prevent serious illness and death due to COVID-19 for both children and adults.
- Help prevent you from needing to go to the hospital due to COVID-19.
- Be a less risky way to protect yourself compared to getting sick with the virus that causes COVID-19.
- Lower long-term risk for cardiovascular complications after COVID-19.

Factors that can affect how well you're protected after a vaccine can include your age, if you've had COVID-19 before or if you have medical conditions such as cancer.

How well a COVID-19 vaccine protects you also depends on timing, such as when you got the shot. And your level of protection depends on how the virus that causes COVID-19 changes and what variants the vaccine protects against.

Talk to your healthcare team about how you can stay up to date with COVID-19 vaccines.

Should I get the COVID-19 vaccine even if I've already had COVID-19?

Yes. Catching the virus that causes COVID-19 or getting a COVID-19 vaccination gives you protection, also called immunity, from the virus. But over time, that protection seems to fade. The COVID-19 vaccine can boost your body's protection.

Also, the virus that causes COVID-19 can change, also called mutate. Vaccination with the most up-to-date variant that is spreading or expected to spread helps keep you from getting sick again.

Researchers continue to study what happens when someone has COVID-19 a second time. Later infections are generally milder than the first infection. But severe illness can still happen. Serious illness is more likely among people older than age 65, people with

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more than four medical conditions and people with weakened immune systems.

Safety and side effects of COVID-19 vaccines

What COVID-19 vaccines have been authorized or approved?

The COVID-19 vaccines available in the United States are:

- Pfizer-BioNTech COVID-19 vaccine 2024-2025 formula, available for people age 6 months and older.
- Moderna COVID-19 vaccine 2024-2025 formula, available for people age 6 months and older.
- Novavax COVID-19 vaccine 2024-2025 formula, available for people age 12 years and older.

These vaccines have U.S. Food and Drug Administration (FDA) emergency use authorization or approval.

Updates to the COVID-19 vaccines
In June 2024, the FDA recommended COVID-19 vaccine updates to target a strain of the COVID-19 virus called JN.1. But JN.1 soon began to fade from the community. Strains that evolved from it began to spread at higher levels. As the virus continued to change, the FDA updated its guidance and asked vaccine makers to focus on a JN.1 strain subtype called KP.2.

The Pfizer-BioNTech and Moderna COVID-19 vaccines for 2024-2025 focus on building protection against the KP.2 virus strain. The Novavax COVID-19 vaccine, adjuvanted 2024-2025 formula will focus on the JN.1 strain.

Pfizer-BioNTech COVID-19 vaccine
In December 2020, the Pfizer-BioNTech COVID-19 vaccine two-dose series was found to be both safe and effective in preventing COVID-19 infection in people age 18 and older. This data helped predict how well the vaccines would work for younger people. The effectiveness varied by age. Since 2020, the vaccine has been updated yearly to better protect against the strains of COVID-19 spreading in the community. The currently approved vaccine is Pfizer-BioNTech COVID-19 vaccine 2024-2025 formula.

The Pfizer-BioNTech vaccine is approved under the name Comirnaty for people age 12 and older. The FDA authorized the vaccine for people age 6 months to 11 years. The number of shots in this vaccination series varies based on a person's age and COVID-19 vaccination history.

Moderna COVID-19 vaccine
In December 2020, the Moderna COVID-19 vaccine was found to be both safe and effective in preventing infection and serious illness among people age 18 or older. The vaccine's ability to protect younger people was predicted based on that clinical trial data. Since 2020, the vaccine has been updated yearly to better protect against the changing strains of COVID-19. The currently approved vaccine is Moderna COVID-19 vaccine 2024-2025 formula.

The FDA approved the vaccine under the name Spikevax for people age 12 and older. The FDA authorized use of the vaccine in people age 6 months to 11 years. The number of shots needed varies based on a person's age and COVID-19 vaccination history.

Novavax COVID-19 vaccine, adjuvanted
In July 2022, this vaccine was found to be safe and effective and became available under an emergency use authorization for people age 18 and older. In August 2022, the FDA authorized the vaccine for people age 12 and older. Since then, the vaccine has been updated yearly to better protect against the changing strains of COVID-19. The currently

approved vaccine is Novavax COVID-19 vaccine, adjuvanted 2024-2025 formula.

How do the COVID-19 vaccines work?

COVID-19 vaccines help the body get ready to clear out infection with the virus that causes COVID-19.

Both the Pfizer-BioNTech and the Moderna COVID-19 vaccines use genetically engineered messenger RNA (mRNA). The mRNA in the vaccine tells your cells how to make a harmless piece of virus that causes COVID-19.

After you get an mRNA COVID-19 vaccine, your muscle cells begin making the protein pieces and displaying them on cell surfaces. The immune system recognizes the protein and begins building an immune response and making antibodies. After delivering instructions, the mRNA is immediately broken down. It never enters the nucleus of your cells, where your DNA is kept.

The Novavax COVID-19 adjuvanted vaccine is a protein subunit vaccine. These vaccines include only protein pieces of a virus that cause your immune system to react the most. The Novavax COVID-19 vaccine also has an ingredient called an adjuvant that helps raise your immune system response.

With a protein subunit vaccine, the body reacts to the proteins and creates antibodies and defensive white blood cells. If you later become infected with the COVID-19 virus, the antibodies will fight the virus. Protein subunit COVID-19 vaccines don't use any live virus and can't cause you to become infected with the COVID-19 virus. The protein pieces also don't enter the nucleus of your cells, where your DNA is kept.

Can a COVID-19 vaccine give you COVID-19?

No. The COVID-19 vaccines available in the U.S. don't use the live virus that causes COVID-19. Because of this, the COVID-19 vaccines can't cause you to become sick with COVID-19.

It can take a few weeks for your body to build immunity after getting a COVID-19 vaccination. As a result, it's possible that you could become infected with the virus that causes COVID-19 just before or after being vaccinated.

What are the possible general side effects of a COVID-19 vaccine?

Some people have no side effects from the COVID-19 vaccine. For those who get them, most side effects go away in a few days.

A COVID-19 vaccine can cause mild side effects after the first or second dose. Pain and swelling where people got the shot is a common side effect. That area also may look reddish on white skin. Other side effects include:

- Fever or chills.
- Headache.
- Muscle pain or joint pain.
- Tiredness, called fatigue.
- Upset stomach or vomiting.
- Swollen lymph nodes.

For younger children up to age 4, symptoms may include crying or fussiness, sleepiness, loss of appetite, or, less often, a fever.

In rare cases, getting a COVID-19 vaccine can cause an allergic reaction. Symptoms of a

life-threatening allergic reaction can include:

- Breathing problems.
- Fast heartbeat, dizziness or weakness.
- Swelling in the throat.
- Hives.

If you or a person you're caring for has any life-threatening symptoms, get emergency care.

Less serious allergic reactions include a general rash other than where you got the vaccine, or swelling of the lips, face or skin other than where you got the shot. Contact your healthcare professional if you have any of these symptoms.

You may be asked to stay where you got the vaccine for about 15 minutes after the shot. This allows the healthcare team to help you if you have an allergic reaction. The healthcare team may ask you to wait for longer if you had an allergic reaction from a previous shot that wasn't serious.

Contact a healthcare professional if the area where you got the shot gets worse after 24 hours. And if you're worried about any side effects, contact your healthcare team.

Are there any long-term side effects of the COVID-19 vaccines?

The vaccines that help protect against COVID-19 are safe and effective. Clinical trials tested the vaccines to make sure of those facts. Healthcare professionals, researchers and health agencies continue to watch for rare side effects, even after hundreds of millions of doses have been given in the United States.

Side effects that don't go away after a few days are thought of as long term. Vaccines rarely cause any long-term side effects.

If you're concerned about side effects, safety data on COVID-19 vaccines is reported to a national program called the Vaccine Adverse Event Reporting System in the U.S. This data is available to the public. The U.S. Centers for Disease Control and Protection (CDC) also has created v-safe, a smartphone-based tool that allows users to report COVID-19 vaccine side effects.

If you have other questions or concerns about your symptoms, talk to your healthcare professional.

Can COVID-19 vaccines affect the heart?

In some people, COVID-19 vaccines can lead to heart complications called myocarditis and pericarditis. Myocarditis is the swelling, also called inflammation, of the heart muscle. Pericarditis is the swelling, also called inflammation, of the lining outside the heart.

Symptoms to watch for include:

- Chest pain.
- Shortness of breath.
- Feelings of having a fast-beating, fluttering or pounding heart.

If you or your child has any of these symptoms within a week of getting a COVID-19 vaccine, seek medical care.

The risk of myocarditis or pericarditis after a COVID-19 vaccine is rare. These conditions have been reported after COVID-19 vaccination with any of the vaccines offered in the United States. Most cases have been reported in males ages 12 to 39.

These conditions happened more often after the second dose of the COVID-19 vaccine

and typically within one week of COVID-19 vaccination. Most of the people who got care felt better after receiving medicine and resting.

These complications are rare and also may happen after getting sick with the virus that causes COVID-19. In general, research on the effects of the most used COVID-19 vaccines in the United States suggests the vaccines lower the risk of complications such as blood clots or other types of damage to the heart.

If you have concerns, your healthcare professional can help you review the risks and benefits based on your health condition.

Things to know before a COVID-19 vaccine

Are COVID-19 vaccines free?

In the U.S., COVID-19 vaccines may be offered at no cost through insurance coverage. For people whose vaccines aren't covered or for those who don't have health insurance, options are available. Anyone younger than 18 years old can get no-cost vaccines through the Vaccines for Children program.

Can I get a COVID-19 vaccine if I have an existing health condition?

Yes, COVID-19 vaccines are safe for people who have existing health conditions, including conditions that have a higher risk of getting serious illness with COVID-19.

The COVID-19 vaccine can lower the risk of death or serious illness caused by COVID-19. Your healthcare team may suggest that you get added doses of a COVID-19 vaccine if you have a moderately or severely weakened immune system.

Cancer treatments and other therapies that affect some immune cells also may affect your COVID-19 vaccine. Talk to your healthcare professional about timing additional shots and getting vaccinated after immunosuppressive treatment.

Talk to your healthcare team if you have any questions about when to get a COVID-19 vaccine.

Is it OK to take an over-the-counter pain medicine before or after getting a COVID-19 vaccine?

Don't take medicine before getting a COVID-19 vaccine to prevent possible discomfort. It's not clear how these medicines might impact the effectiveness of the vaccines. It is OK to take this kind of medicine after getting a COVID-19 vaccine, as long as you have no other medical reason that would prevent you from taking it.

Allergic reactions and COVID-19 vaccines

What are the signs of an allergic reaction to a COVID-19 vaccine?

Symptoms of a life-threatening allergic reaction can include:

- Breathing problems.

- Fast heartbeat, dizziness or weakness.
- Swelling in the throat.
- Hives.

If you or a person you're caring for has any life-threatening symptoms, get emergency care right away.

Less serious allergic reactions include a general rash other than where you got the vaccine, or swelling of the lips, face or skin other than where the shot was given. Contact your healthcare professional if you have any of these symptoms.

Tell your healthcare professional about your reaction, even if it went away on its own or you didn't get emergency care. This reaction might mean that you are allergic to the vaccine. You might not be able to get a second dose of the same vaccine. But you might be able to get a different vaccine for your second dose.

Can I get a COVID-19 vaccine if I have a history of allergic reactions?

If you have a history of severe allergic reactions not related to vaccines or injectable medicines, you may still get a COVID-19 vaccine. You're typically monitored for 30 minutes after getting the vaccine.

If you've had an immediate allergic reaction to other vaccines or injectable medicines, ask your healthcare professional about getting a COVID-19 vaccine. If you've ever had an immediate or severe allergic reaction to any ingredient in a COVID-19 vaccine, the CDC recommends not getting that specific vaccine.

If you have an immediate or severe allergic reaction after getting the first dose of a COVID-19 vaccine, don't get the second dose. But you might be able to get a different vaccine for your second dose.

Pregnancy, breastfeeding and fertility with COVID-19 vaccines

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Can pregnant or breastfeeding women get the COVID-19 vaccine?

The CDC recommends getting a COVID-19 vaccine if:

- You are planning to or trying to get pregnant.
- You are pregnant now.
- You are breastfeeding.

Staying up to date on your COVID-19 vaccine helps prevent severe COVID-19 illness. It also may help a newborn avoid getting COVID-19 if you are vaccinated during pregnancy.

People at higher risk of serious illness can talk to a healthcare professional about additional COVID-19 vaccines or other precautions. It also can help to ask about what to do if you get sick so that you can quickly start treatment.

Children and COVID-19 vaccines

If children don't often experience severe illness with COVID-19, why do they need a COVID-19 vaccine?